NOTES TO ARCHITECT

SECTION 04220 - CONCRETE UNIT MASONRY

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

As specified in Section **00700.**

1.02 SUBMITTALS

The masonry manufacturer's certification that the masonry units comply with **UBC Standard 21-4 (1994 Ed.)** and the curing requirements specified herein shall be submitted to the Engineer upon request.

1.03 SAMPLE BLOCKS

A sample of each of the masonry units required shall be submitted for approval to the Engineer upon request.

1.04 DELIVERY, STORAGE AND HANDLING

A. Masonry Units: Masonry units delivered to the jobsite shall conform to the moisture content requirements as specified under **UBC Standard 21-4 (1994 Ed.)**. Masonry units shall be stored off the ground and protected from inclement weather and physical damage. All units shall be handled with reasonable care to prevent marring or damaging of faces, edges and corners of units. In no case shall dumping of units from hand trucks or wheelbarrows be permitted.

Where used in exposed wall construction, any unit with exposed face or faces having chips, cracks, or other imperfections more than 1 inch in dimension shall be rejected.

B. Mortar and Grout Materials: Portland cement, masonry cement, mortar cement, lime and admixtures shall be stored in such a manner as to prevent deterioration or contamination with foreign matter. Cement which has become caked, partially set or otherwise deteriorated, or any material which becomes damaged or contaminated, shall be rejected.

Exercise care in the preparation of plans and specifications to indicate which walls and partitions are to be baffle walls, partitions, end walls, sound walls, fire walls, decorative screen block walls, and other types. Consider preparing a wall schedule for large or complex jobs. Call out and/or detail special conditions affecting specific walls. Also coordinate between the structural requirements and appearance of masonry walls, since the size of reinforcement or location may affect the size of joints, their location, and the use of full or cut blocks, and other such variations.

At the end of Sub-Section 1.03, delete the phrase "upon request" when masonry components are designed as load bearing.

Insert "for strength testing by the State" in lieu of "for approval ... upon request" when walls are designed as load bearing and strength is important.

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PART 2 - PRODUCTS

2.01 MATERIALS

A. Hollow Concrete Masonry Units shall be load-bearing units and shall conform to the requirements of **UBC Standard No. 21-4 (1994 Ed.)**, Grade N-II. Units shall be 2-core type, 8-inch nominal height, 16-inch nominal length and width as indicated on the plans. Units for jamb, corner sill, lintel and other special shapes shall be provided as required.

All units shall be sound, free of cracks, straight and true. They shall be either steam-cured or cured under atmospheric conditions for a minimum of 30 days. Color shall be standard with manufacturer.

If light weight units, bricks or special texture units are used, these must also be specified herein. Use of bricks or special texture units must be approved by the State Public Works **Administrator**.

B. Screen Blocks shall be standard units manufactured to same specifications as non-load-bearing concrete block masonry units, pattern as indicated.

C. Portland Cement shall conform to ASTM C-150, Type I or Type II.

D. Mortar Cement (Type M) shall conform to the requirements of UBC Standard No. **21-14 (1994 Ed.)** "Mortar Cement". Conformance to this standard shall be noted on the material package. ("Supermortar" by Hawaiian Cement, or approved equal.)

E. Hydrated Lime shall conform to the ASTM C-207, Type S.

F. Aggregate for use in mortar shall conform to ASTM C-144.

G. Aggregate for use in grout shall conform to ASTM C-404, with grading in accordance with ASTM D-448, No. 10.

H. Water used in mixing mortar or grout shall be clean and free from injurious amounts of oils, acids, alkalis, salts, organic materials or other substances that may be deleterious to either the mortar or reinforcement. Non-potable water shall not be used.

I. Horizontal Reinforcement shall be trussed or ladder design with #9 gauge, deformed side rods and welded #12 gauge or larger cross rods ("Dur-O-Wal", "Blok-Mesh", or approved equal), or as otherwise indicated on the plans.

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J. Reinforcing Steel shall be deformed bars conforming to ASTM A-615, grade as shown on plans.

Delete if deformed billet bars are used instead.

K. Rebar Wire Positioners shall be galvanized, No. 9 gauge wire, manufactured positioners per ASTM A82 or other suitable devices.

L. Additives/Admixtures for mortar shall be "Easy Spred" by American Colloid Co. or approved equal.

PART 3 - EXECUTION

3.01 MORTAR AND GROUT

A. The proportioning of materials for mortar and grout shall be by volume and done in such manner that the specified proportions can be controlled and accurately maintained. Fine aggregate shall be measured in a damp loose condition. Mixing shall be by a mechanical batch mixer for at least 3 minutes for mortar and 5 minutes for grout, but for not more than 10 minutes. Hand mixing shall be permitted only for small batches of 3 cubic feet or less.

B. Mortar shall be freshly prepared and uniformly mixed in one of the following proportions:

1. Type M - Cement-lime Mortar:
   1 part portland cement
   1/4 part hydrated lime
   3 to 3-3/4 parts mortar aggregate

2. Type S - Cement-lime Mortar:
   1 part portland cement
   1/4 to 1/2 part hydrated lime
   Mortar aggregate: Not less than 2-1/4 and not more than 3 times the sums of the separate volumes of cementitious materials.

3. Type M - Mortar Cement Mortar:
   1 part mortar cement
   2-1/2 to 3 parts mortar aggregate

Sufficient water shall be used to provide a workable consistency. Mortar shall be used and placed in final position within 1-1/2 hours after mixing.

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4. Type M Mortar
   2 sacks portland cement
   1/2 to 1 - 7 lb. bag Easy Spred
   6 cu. ft. mortar aggregate

5. Type M Mortar:
   1 sacks portland cement
   3 ounces MRF
   2-1/4 to 2-3/4 cu. ft. mortar aggregate

6. Type S Mortar:
   2 sacks portland cement
   1 - 7 lb. bag Easy Spred
   9 cu. ft. mortar aggregate

7. Type S Mortar
   1 sack portland cement
   3 ounces MRF
   2-1/2 to 3 cu. ft. mortar aggregate

The above mixes **4 through 7** shall be prepared strictly in accordance with the **admixture** manufacturer's instructions. Placement of the mortar shall be completed within 2-1/2 hours after mixing. No materials which start to set shall be retempered.

C. Grout (coarse) mixed on-site shall conform to ASTM C 476 and shall be freshly prepared and uniformly mixed in the following proportion:

   1 part portland cement
   0 to 1/10 part hydrated lime
   Fine Aggregate: 2-1/4 to 3 times the sum of the volumes of the cementitious materials.
   Course Aggregate: 1 to 2 times the sum of the volumes of the cementitious materials.

   Grout designed by Ready-mix suppliers may be used upon approval of the Engineer.

   Sufficient water shall be used to produce a consistency just fluid enough for pouring or pumping without segregation. Grout shall be used and placed in final position within 90 minutes after mixing, but shall in no case be used after initial set has occurred.

   In any event, the grout shall attain not less than 2,500 psi 28-day compressive strength per ASTM C 1019 unless noted otherwise on drawings.

The mix specified is for "Coarse Grout". If your design will have conditions where the proper flow of the grout will be affected by the amount and placement of steel reinforcement, amend the specs to include "Fine Grout" as noted in the UBC.

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3.02 REINFORCEMENT

A. Reinforcement shall be free from scale, loose flaky rust or other coatings that will destroy bond. It shall be straight except for bends around corners or where bends or hooks are detailed. Size and spacing shall be as indicated on the drawings.

B. Vertical reinforcement shall be accurately placed and secured against displacement by rebar wire positioners at top and bottom and at intervals not to exceed 200 diameters of the reinforcement (8 feet for #4 bars; 10 feet for #5 bars). Dowels and splices shall be lapped as indicated but not less than 30 diameters or 15 inches, whichever is longer. At jambs of doors, windows and other openings, and corners and ends of walls, including those abutting concrete, one #5 bar shall be installed in the end cell unless heavier reinforcement is otherwise called for on the plans and that cell shall be filled with grout. Bars ajacent to all openings and at corners and ends of walls shall extend the full height of walls.

Show location and details on plans.

C. At intersections, corners and splices, horizontal reinforcing shall be placed, bent and lapped as shown on the plans. End laps shall be at least 30 diameters.

3.03 ANCHORS

Work with other trades shall be coordinated as necessary to set into tile walls all anchors, bolts, nailing blocks, etc. Anchors shall be grouted around with sufficient mortar to make them secure.

3.04 LAYING

A. General: All masonry units shall be clean and dry and shall be handled so that edges and faces will not be chipped, spalled, or cracked. All beds on which masonry is to be laid shall be cleaned. All work shall be built plumb, level, and true, within the tolerances specified below, and shall be laid up with whole units except at closures.

If metal frames are used such as for doors, etc. requiring embedded anchors, include instructions for frames to be in place as walls are laid up.

Masonry units in walls shall be laid so that one face of the wall is a true flat plane. Unless otherwise indicated on the plans, this shall be on the inside face. Where one face of a wall is to be plastered or covered, the exposed face shall be the true flat plane. All cutting and fitting as may be required for and necessary to accommodate other trades shall be done neatly using a power driven carborundum saw. It shall be the responsibility of the Contractor to control any dust pollution caused by the cutting operations. All drilling and cutting of small holes shall be neatly done. Bolts, anchors, ties, conduits, and similar items required for the installation of work under other sections of these specifications shall, as far as practicable, be placed as the work progresses. All walls and partitions shall be carried to the underside of beams, slabs, or joists, as the case may be, and shall be connected at the top as shown on the plans.

B. Allowable Tolerances:

1. Variation from the Plumb — Detail on plans.

   a. In the lines and surfaces of columns, walls and arrises:

      in 10 ft. 1/4"
      in any story or 20 ft. max. 3/8"
      in 40 ft. or more 1/2"

   b. For external corners, control joints and other conspicuous lines:

      in any story or 20 ft. max. 1/4"
      in 40 ft. or more 1/2"

2. Variation from the level or grades indicated on the plans:

   For exposed lintels, sills, parapets, horizontal grooves and other conspicuous lines:

      in any bay or 20 ft. max. l/4"
      in 40 ft. or more 1/2"

3. Variation of the linear building lines from

established position in plan and related portion of columns, walls and partitions:

in any bay or 20 ft. max. 1/2"
in 40 ft. or more 3/4"

4. Variation in cross-sectional dimensions of columns and in the thickness of walls:

   minus 1/4"; plus 1/2"

5. For window and door openings:

   a. Maximum variations as specified in Paragraphs B.1. and B.2. for plumb and level of masonry work.

   b. Maximum variation of 3/8" in each dimension from that specified or dimensioned.

   c. Tolerance requirements for both dimensions and plumb-and-level must be met.

6. Checking and setting:

   The following tools and methods shall be the minimum or acceptable type:

   a. Plumb and level shall be determined by level and/or pull string method.

   b. An instrument at least 4 feet long shall be used for leveling or runs. A shorter level may be used for cross-leveling of units.

C. Masonry units shall not be wet before being used and units which have gotten wet shall be thoroughly dried before being used. Where no bond pattern is shown, the wall shall be laid up in straight uniform course with regular running bond.

D. Masonry units in first course shall be laid with shell mortar beds not exceeding 3/4" in thickness. Webs of adjoining cells containing reinforcement shall also be bedded in mortar to prevent escape of grout.

   Vertical head joints shall be mortared well for a thickness equal to the face shell of the block and these joints shall be shoved tightly so that

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the mortar bonds well to both blocks. Joints shall be solidly filled from the face of the block to the depth of the face shell.

E. If it is necessary to move a block so as to open a joint, the block shall be removed from the wall, cleaned and reset in fresh mortar.

F. Mortar joints shall be straight, clean and in a thickness of 3/8" + 1/8". All exposed horizontal and vertical joints shall be tooled with a 1/2" to 5/8" round bar at least 14 inches long to produce a dense, slightly concave surface well bonded to the block at the edges. Tooling shall compact the mortar, pressing the excess mortar out of the joint rather than gouging it out. Use a 3/8" diameter half-round molding to simulate a concave horizontal joint between a concrete bond beam and the hollow tile wall below. Where walls are to receive plaster or where they are not exposed, such as below finish grade and where special glazed finish is indicated, the joints shall be struck flush.

If flush mortar joints are used for exposed work, they shall be carpet-floated in order to present a surface that will not have a sheen when painted.

Raked joints, struck joints, & squeeze joints are not permitted on exterior of buildings because of leakage at joints.

G. All hollow masonry units shall be built to preserve the unobstructed vertical continuity of the cells to be filled. Walls and cross webs forming such cells shall be full-bedded in mortar to prevent the leakage of grout.

H. All cells containing reinforcement shall be filled solidly with grout in lifts not exceeding 8 feet unless otherwise shown on the plans. Other cells, where indicated to be solid for anchors or such items, shall also be filled. When grouting is stopped for one hour or longer, horizontal construction joints shall be formed by stopping the pour of grout 1-1/2" below the top of the uppermost unit.

Indicate locations of filled cells on plans. Do not use toggle bolts where heavy usage or impact loads are anticipated. Also, if cells are to be filled solid for some special purpose, such as for acoustical req'mt., include instructions describing this work.

I. Care shall be taken to prevent mortar splotches. All forms shall be made tight and concrete or grout spilled on the wall shall be washed off immediately before it can set up. Walls shall be protected against stains and excess mortar shall be wiped off the surface as the work progresses. After the wall is constructed, it shall not be saturated with water for curing, cleaning, etc.

3.05 PROTECTION AND CLEANING

A. While masonry walls are being built, they shall

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be protected when not being worked on to prevent rain from saturating the wall. Covering of suitable materials such as canvas or plastic sheeting shall be placed atop the wall and shall extend at least two feet on either side of the wall. Covering shall be weighted down to prevent it from being lifted by the wind.

Delete this paragraph for projects having interior work only.

B. At the completion of the work, all holes or defective mortar joints in exposed masonry shall be pointed and where necessary defective joints shall be cut out and repointed. All exposed masonry shall be thoroughly cleaned of mortar drippings, sand and splotches during the course of the work. No smoothing of a wall surface which produces a "bright spot" when painted will be accepted. All adjoining work subject to damage shall be carefully protected.

C. Upon completion of work, all surplus, waste materials, rubbish and debris shall be removed from the premises, leaving same in clean and satisfactory condition.

END OF SECTION